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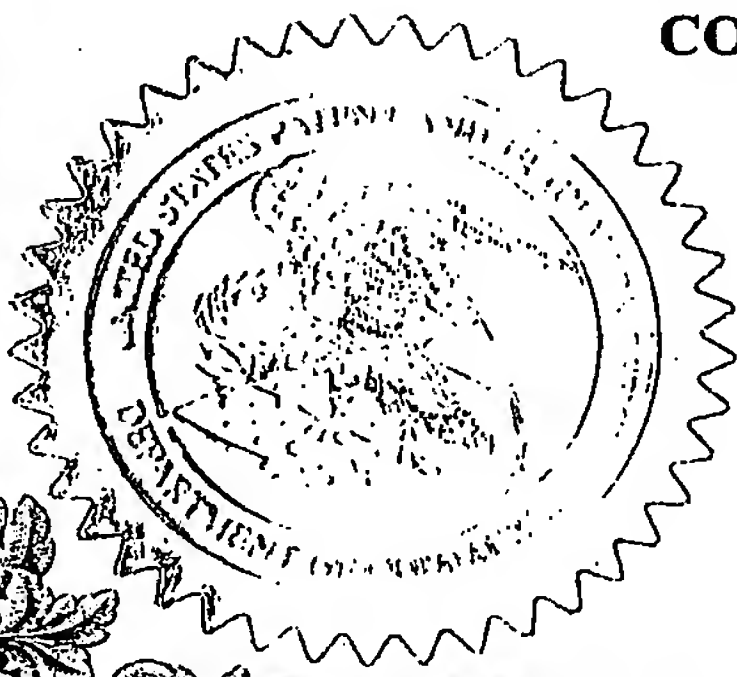
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This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

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TITLE OF THE INVENTION (280 characters max)					
HOPPER CONTAINER					
Direct all correspondence to:		CORRESPONDENCE ADDRESS			
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification		Number of Pages	11	<input type="checkbox"/> CD(s), Number	
<input checked="" type="checkbox"/> Drawing(s)		Number of Sheets	5	<input type="checkbox"/> Other (specify)	
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)					
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)	
<input checked="" type="checkbox"/> A check or money order is enclosed to cover the filing fees					
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
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Respectfully submitted,

SIGNATURE

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02/20/2004

REGISTRATION NO.

47.345

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HOPPER CONTAINER

FIELD OF THE INVENTION

The present invention relates to a container having a hopper discharge and which is suitable for stacking on railcars or on trucks and the like.

5. BACKGROUND

Shipping of particulate material including grain and the like is commonly accomplished by supporting the material in hopper rail cars or hopper trucks. When shipping overseas, the material must be unloaded from the hopper rail cars or trucks, typically for storage in a large common area in a ship. The material
10 must then be again unloaded from the ship and into individual hopper rail cars or trucks upon reaching the overseas destination. Considerable material is lost due to spoilage or spilling while transferring the material from one container to another or while storing the material in a manner in which it is not protected suitably from the elements. Considerable time is also lost for repetitive steps of loading and
15 unloading from hopper rail cars to hopper trucks or to the cargo hull of a ship.

SUMMARY

According to one aspect of the present invention there is provided a container comprising:

at least one compartment including:

20 a hopper formed at a bottom end of said at least one compartment which tapers downwardly and inwardly to a chute opening;

a gate member which selectively closes the chute opening of said at least one compartment; and

a hatch opening at a top end of said at least one compartment which is
25 selectively covered by a hatch cover; and

a frame surrounding the hopper of said at least one compartment for

supporting the container on a generally horizontal supporting surface. The hopper container according to the present invention can thus supported similarly to standard box type containers on container carriers and the like.

5 The use of a container including a hopper formed therein and a frame surrounding the hopper permits a hopper-type container for storing particulate material therein to be readily transported from railcars to trucks or into the cargo hull of ship by moving the container itself with the product therein. Accordingly there is no longer a need to empty the particulate material from conventional hopper rail cars and subsequently transfer the material to trucks or cargo ships previously resulting
10 in frequent spillage and lost product from spoilage. Furthermore by maintaining the material within a single container during transport, the container can be readily sealed to prevent spoilage due to access to the product by moisture and the like or due to contamination.

BRIEF DESCRIPTION OF THE DRAWINGS

15 In the accompanying drawings, which illustrate an exemplary embodiment of the present invention:

Figure 1 is a perspective view of the hopper container.

Figures 2 and 3 are respective side elevational and top plan views of the hopper container.

20 Figures 4 and 5 are respective bottom plan and end elevational views of the hopper container.

Figure 6 is an enlarged plan view of one of the gates.

Figure 7 is a side elevational view of the gate.

Figure 8 is a top plan view of one of the hatch covers.

25 Figure 9, Figure 10 and Figure 11 are side elevational views of the hatch cover shown in a closed positioned, a partly open position and a fully open

position respectively.

DETAILED DESCRIPTION

Referring to the accompanying drawings, there is illustrated a hopper container generally indicated by reference numeral 10. The container 10 is particularly suited for the shipping and transport industry for being handled similarly to conventional railway box containers which are stackable and which can be supported on container carrier railcars and trucks.

The hopper container 10 has a rectangular frame 12 which fully surrounds the container so that the container is suitable for supporting in a stacking configuration or on a generally horizontal supporting surface. The frame includes two bottom rails 14 which are parallel and spaced apart along opposing sides of the container along the bottom thereof.

Two top rails 16 are similarly parallel and spaced apart from one another along opposing sides of the top side of the container. Corner posts 18 join the top and bottom rails at each of the corners of the frame. A plurality of side posts 20 span between the top and bottom rails, parallel to the corner posts at spaced positions along respective sides of the container. The rails and posts forming the structure of the frame 12 each comprise an angle formed of two perpendicular flanges to provide suitable strength to the frame.

Corner connectors 22 are provided at each of the corners frame 12 to permit the containers to be interlocked with one another when stacking similarly to conventional box-type railway containers. The frame further includes cross bars 23 which extend between the bottom rails 14 at spaced positions therealong and at respective ends thereof and similarly span the top rails 16 at spaced positions therealong and at respective end thereof. The cross bars 23 are similarly formed of an angle comprising two perpendicular flanges and are similarly interconnected

between the corner connectors 22.

A center divider wall 24 is centrally located between the end walls of the container parallel thereto so as to fully span between opposing sides and between the top and bottom of the container. Partition walls 26 are also provided
5 which are parallel to the center divider wall 24 spaced between the center divider wall and the ends of the container. Each of the walls 24 and 26 separates the hopper container 10 into a plurality of individual compartments 28. The number of divider walls and compartments formed depends upon the length of the container. A
10 twenty foot container is typically divided into two compartments whereas a forty foot long container is typically divided into four compartments. Accordingly partition walls 26 may not be required in a twenty foot long container as only a central divider wall 24 is sufficient.

Sheeted material 30 in the form of sheet metal spans the top, sides and end walls of the frame to enclose the compartments 28 formed by the walls 24
15 and 26. The sheeted material 30 may be formed in full sections which span a full length of the container or which span only the length of respective compartments 28. The top sheet 32 is located spaced below a height of the top rails 16 to provide sufficient space and clearance for hatch covers 34 associated with each of the compartments 28. A bottom side of each compartment 28 is enclosed by a hopper
20 36 having walls which converge downwardly and inwardly to a chute opening 38. A suitable gate 40 is mounted across the chute opening 38 for selectively closing the chute opening. The bottom of the hopper and the gate 40 supported thereon of each compartment 28 is spaced above a bottom side of the rails 14 at the bottom of the frame to provide clearance for the gates to open and close even when the
25 containers are stacked a top one another or on top of the ground.

The components of the frame 12 and sheeted material 30 spanning the

frame members to form the compartments 28 are all formed of aluminium and are of suitable dimension to form resulting hopper containers 10 which correspond in size to the conventional box-type containers. A forty foot long hopper container would typically be eight feet in width and nine feet in height while being divided into either
5 three or four compartments resulting in a typical weight of approximately 119,000 lbs when loaded with product. Alternatively a twenty foot long container also having a width of eight feet and a height of nine feet would typically weight approximately 59,500 lbs. when loaded with product.

Each gate 40 includes a collar 42 which defines the chute opening 38
10 therein which is approximately twenty-two inches in diameter. A slot 44 extends circumferentially half way around the collar 42 for slidably receiving a gate panel 46 therethrough. The top and bottom edges of the slot 44 in abutment with the gate panel include a suitable sealing member 48 formed therealong which seals against the gate panel in sliding engagement therewith. Diametrically opposite the slot 44, a
15 compressible seal 50 similarly extends circumferentially around the collar 42 in alignment with the slot 44 for abutment with a rounded free end of the gate panel 46 when the gate is closed.

Opening of the gate is accomplished by slidably removing the gate panel 46 from the chute opening 38 by slidably receiving the gate panel through the
20 slot 44. When open, the chute opening 38 is fully cleared of the gate panel so as to be unobstructed. The gate panel 46 is supported in a track 52 which slidably guides the gate panel therealong between the open and closed positions. A surrounding enclosure 54 receives the track 52 and the gate panel in the open position of the gate. A suitable gear driven actuator 56 is provided for controlling opening and
25 closing of the gate by a suitable crank connection 58 accessible from either side of the container by a suitable driving rotary tool. The collar 42, gate panel 46 and all

associated components for opening and closing the gate are formed as an integral unit which is secured to the bottom of the hopper 36 by threaded fasteners to permit ready removal and replacement thereof as required for repair.

5 The components of the gate are made from lightweight materials, for example aluminium, plastic and ploys. The configuration of the gate panel permits opening and closing of the gate in a sliding configuration which is low in profile to permit the gate to be fully contained above the bottom side of the frame while opening and closing so that opening and closing is permitted while the hopper containers are in a stacked configuration. The enclosure ensures that all
10 mechanisms of the unit are protected from the elements. The gate will typically clear the bottom of the container by three to four inches with the mechanism only being three to five inches in total height so as not to interfere with other containers when stacked. Stops are preferably provided to control opening and closing of the gates for protection of the mechanism. The materials forming the components of the gate
15 are sufficiently durable to resist the elements and resist breaking even during extreme weather conditions.

The hatch covers 34 are each associated with a respective one of the compartments 28 and are positioned so as to be in vertical alignment with the respective gate 40 associated with that compartment 28. The hatch covers 34
20 enclose a hatch opening 60 formed in the top sheet 32 of the container. The hatch openings similarly include a collar 62 defining the opening by the interior diameter of the collar. The hatch openings preferably have a diameter which is greater than the gate openings so as to be approximately 24 inches in diameter. The covers 34 are circular in plan view with a depending peripheral flange 64 having a suitable seal
25 formed at an interior thereof for overlapping the exterior of the collar 62.

A support arm 66 mounts the cover on a free end thereof and rides

within a respective track 68 for sliding displacement of the cover between the open and closed positions similarly to the gate. The support arm 66 guides the cover along the track to first raise the cover from the collar 62 initially in the closed position and subsequently slidably displace the cover in a radial direction in relation to the collar 62. Sliding movement continues along the track 68 until the hatch opening 60 is fully opened and clear of obstruction from the cover 34.

An enclosure 70 receives the cover 34, the support arm 66 and houses the track 68 therein to protect these components from the elements. A gear drive and suitable crank mechanism which is accessible from both sides of the container is similarly provided. The components of the hatch covers are sufficiently low in profile to be supported below the top side of the frame 12 of the container while opening to permit opening and closing of the hatch covers while the containers are stacked. The collar 62, the components associated with the track and the enclosure 70 are all formed as an integral unit which is bolted onto the top wall of the container to permit ready removal and replacement thereof if required for repair.

The hatch covers are similarly made from lightweight materials including aluminium, plastics and the like. The track permits opening and closing of the hatch covers in a low profile sliding manner. All of the working components including the track and support arm are enclosed within the enclosure 70 to be protected from the elements. The collar 62 defining the rim of the hatch openings 60 is located approximately two inches above the top sheet of the compartments 28. The highest part of the mechanism controlling opening and closing of the hatch covers is within 5 or 5 ½ inches from the top of the sheet 32 forming the top of the compartments so that the mechanism for opening and closing the hatch covers is approximately an 1 ½ inches below the top side of the frame 12. In this manner other containers can be loaded on top of the hopper container without hitting the

hatch covers. The bolt-on design of the hatch covers readily permits replacement thereof in the event that either the components are broken or inoperable. Suitable sealing is provided by the peripheral gasket ideally formed of rubber. Stops are preferably provided which control the opening and closing of the hatch cover to prevent damage to the mechanisms and driving movement of the hatch cover. All of the components of the hatch covers are formed of materials having suitable strength to resist damage or breaking during extreme weather conditions.

When loaded on a railcar, the hopper containers 10 are similarly filled with grain or other particulate materials by loading the compartments through the respective hatch covers thereof similarly to conventional hopper railcars. When it is desirable to transfer the product being shipped in the hopper containers from one mode of transport to another, the hopper containers are simply lifted from the deck of the rail cars upon which they are supported to be subsequently deposited on a truck or within the cargo hull of a ship. The rectangular nature of the frame surrounding the hopper container readily permits stacking and interlocking similarly to conventional box-type containers used in the railway industries. In some embodiments, the hopper containers may be lined with a poly or plastic if needed to provide a watertight atmosphere. The frame readily permits stacking of the containers for storage and for unloading. When unloading, alignment of the gates of the various compartments with hatches of a corresponding container upon which it is supported readily permits product to be dispensed from the gate opening of a first container to the hatch opening of a second container therebelow. The narrower opening of the gates in comparison to the hatch openings ensures minimal product escapes when emptying from one container to the next.

As compared to conventional handling of grain according to current practices, the use of the hopper containers according to the present invention would

involve less handling of product, quicker destination times, lower costs to the shippers and buyers, and accordingly a higher profit margin with quicker turnaround time on railcars and trucks.

5 In further embodiments, the top sheet 32 of the container may have a convex outer surface in cross sectional profile.. The sheet would then curve downwardly and laterally outwardly at opposing sides to the respective top rails 16. Suitable drainage holes may be provided in the top rails 16 to prevent accumulation of rain water at the rails.

10 While one embodiment of the present invention has been described in the foregoing, it is to be understood that other embodiments are possible within the scope of the invention. The invention is to be considered limited solely by the scope of the appended claims.

CLAIMS:

1. A container comprising:
at least one compartment including:
a hopper formed at a bottom end of said at least one
5 compartment which tapers downwardly and inwardly to a chute opening;
a gate member which selectively closes the chute opening of
said at least one compartment; and
a hatch opening at a top end of said at least one compartment
which is selectively covered by a hatch cover; and
10 a frame surrounding the hopper of said at least one compartment for
supporting the container on a generally horizontal supporting surface.
2. The container according to Claim 1 wherein said at least one
compartment comprises a plurality of compartments each having a respective gate
member and hatch openings.
- 15 3. The container according to Claim 1 wherein the frame extends
along a full rectangular perimeter about the hopper container.
4. The container according to Claim 1 wherein the gate member is
fully contained within an area bound by the frame.
5. The container according to Claim 1 wherein the hatch cover is
20 fully contained within an area bound by a perimeter of the frame.
6. The container according to Claim 1 wherein the gate member
and the hatch opening of said at least one compartment are in vertical alignment
with one another.
7. The container according to Claim 1 in combination with a
25 container carrying rail car having a deck upon which the frame of the container is
supported, wherein the hopper of said at least one compartment of the container is

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supported above the deck of the rail car.

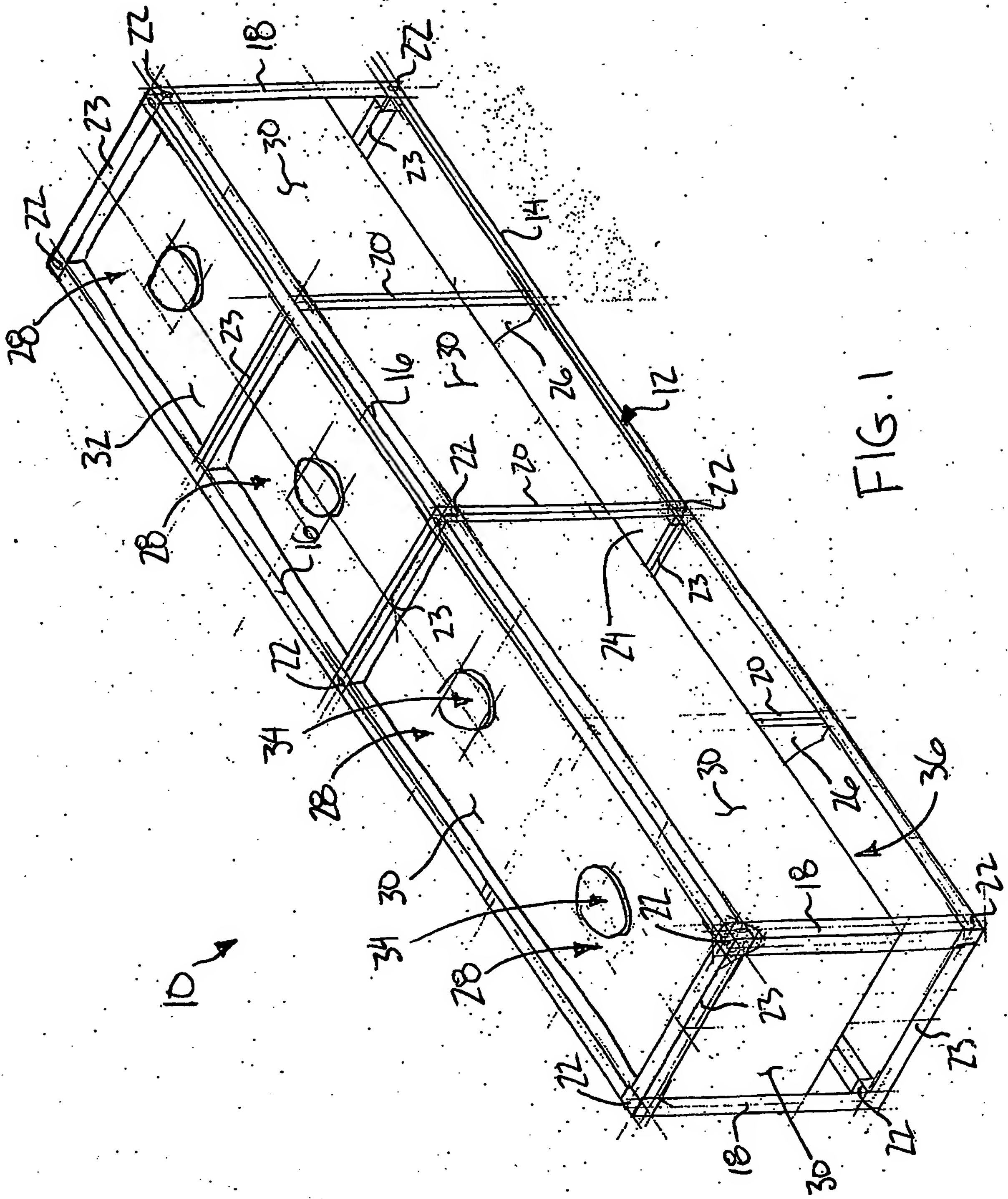
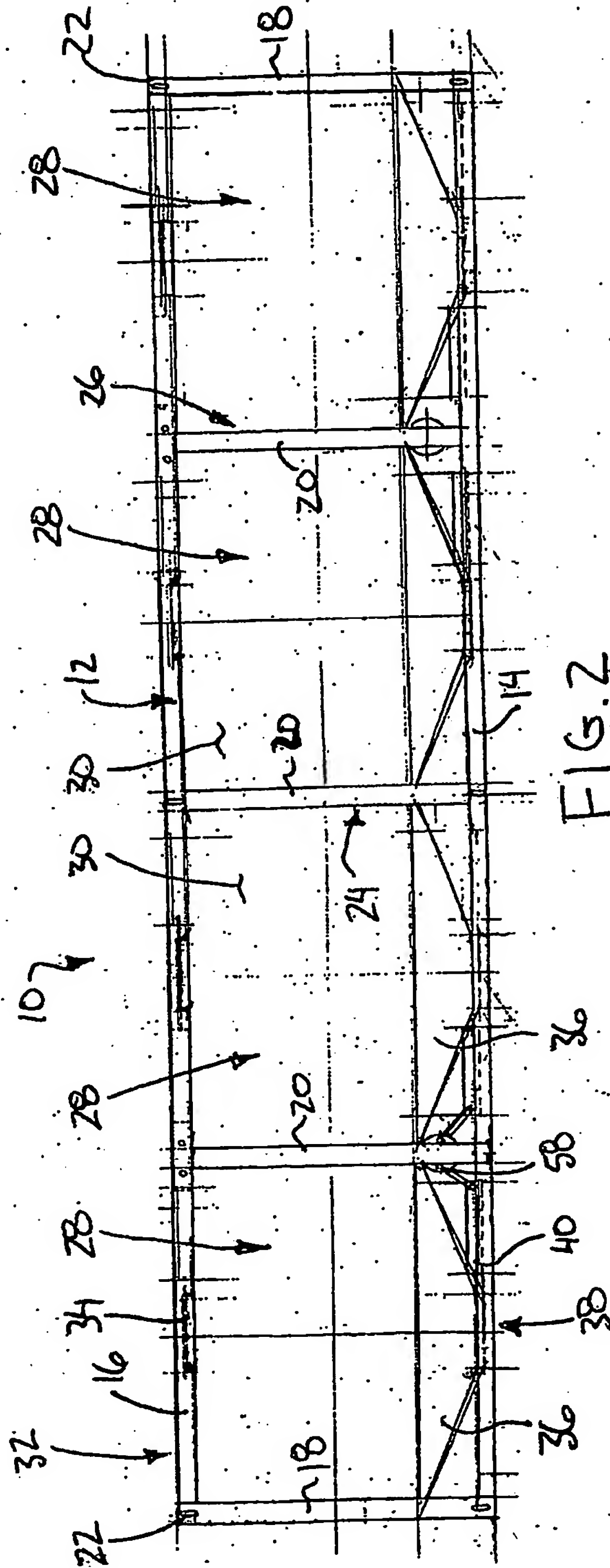
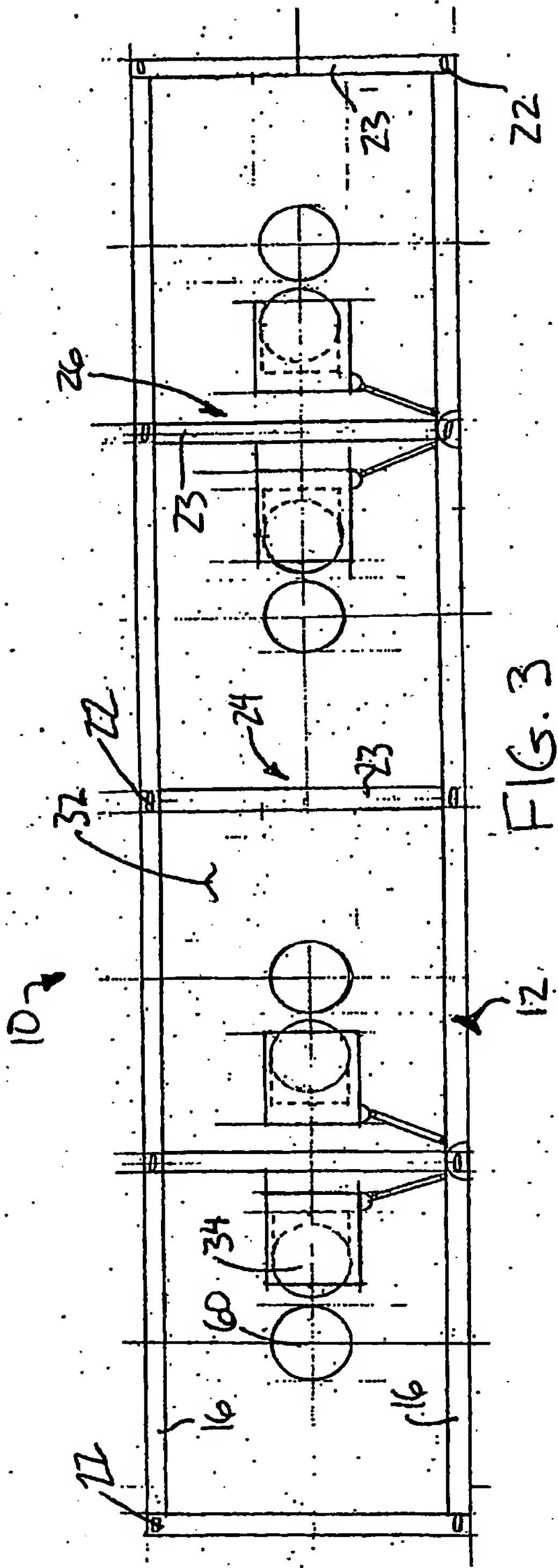


FIG. 1

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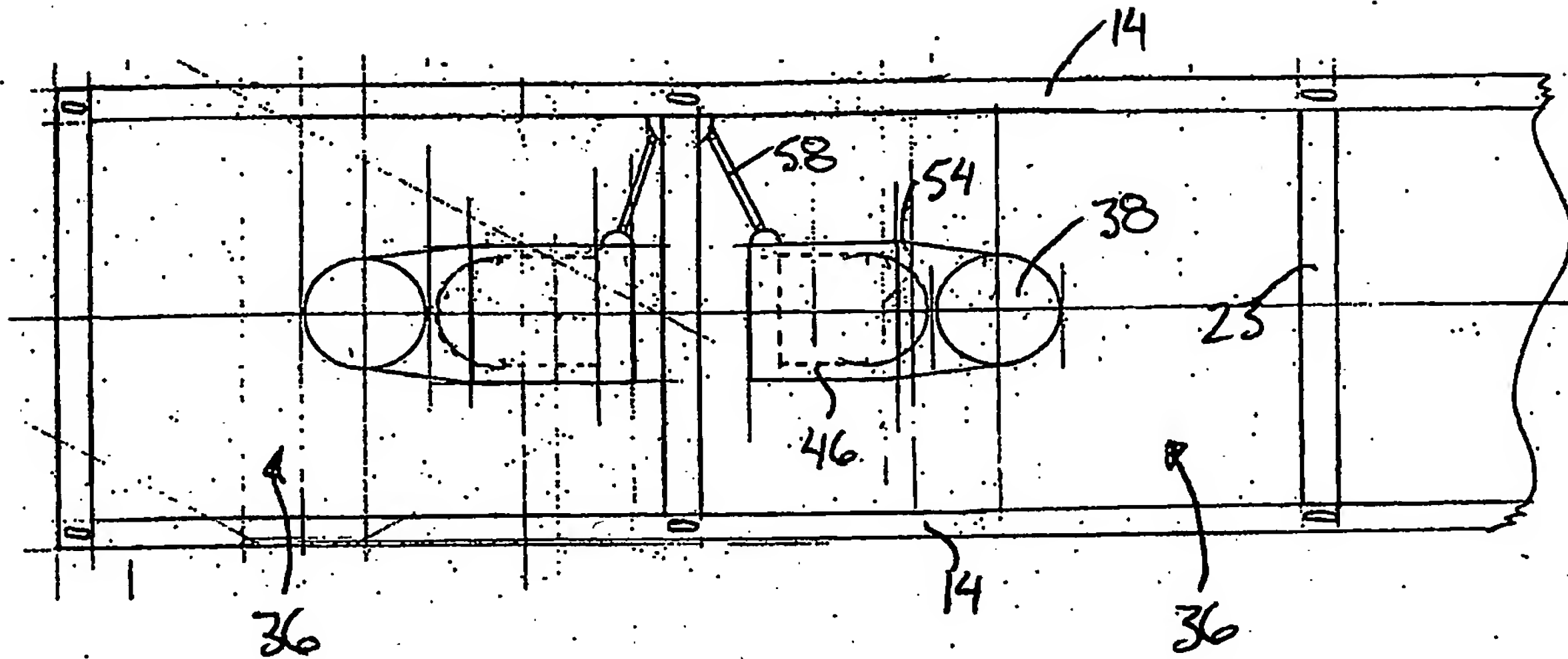


FIG. 4

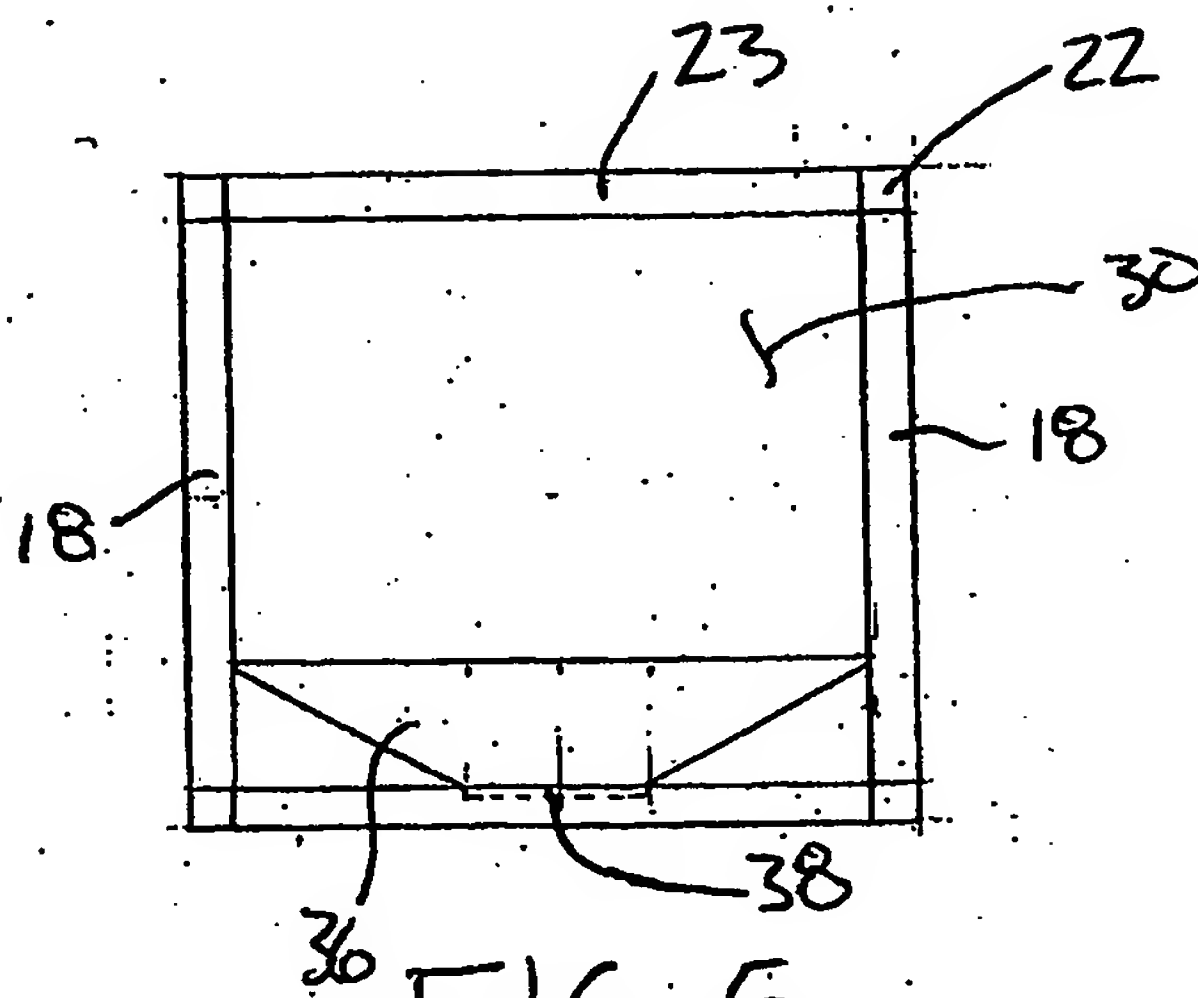


FIG. 5

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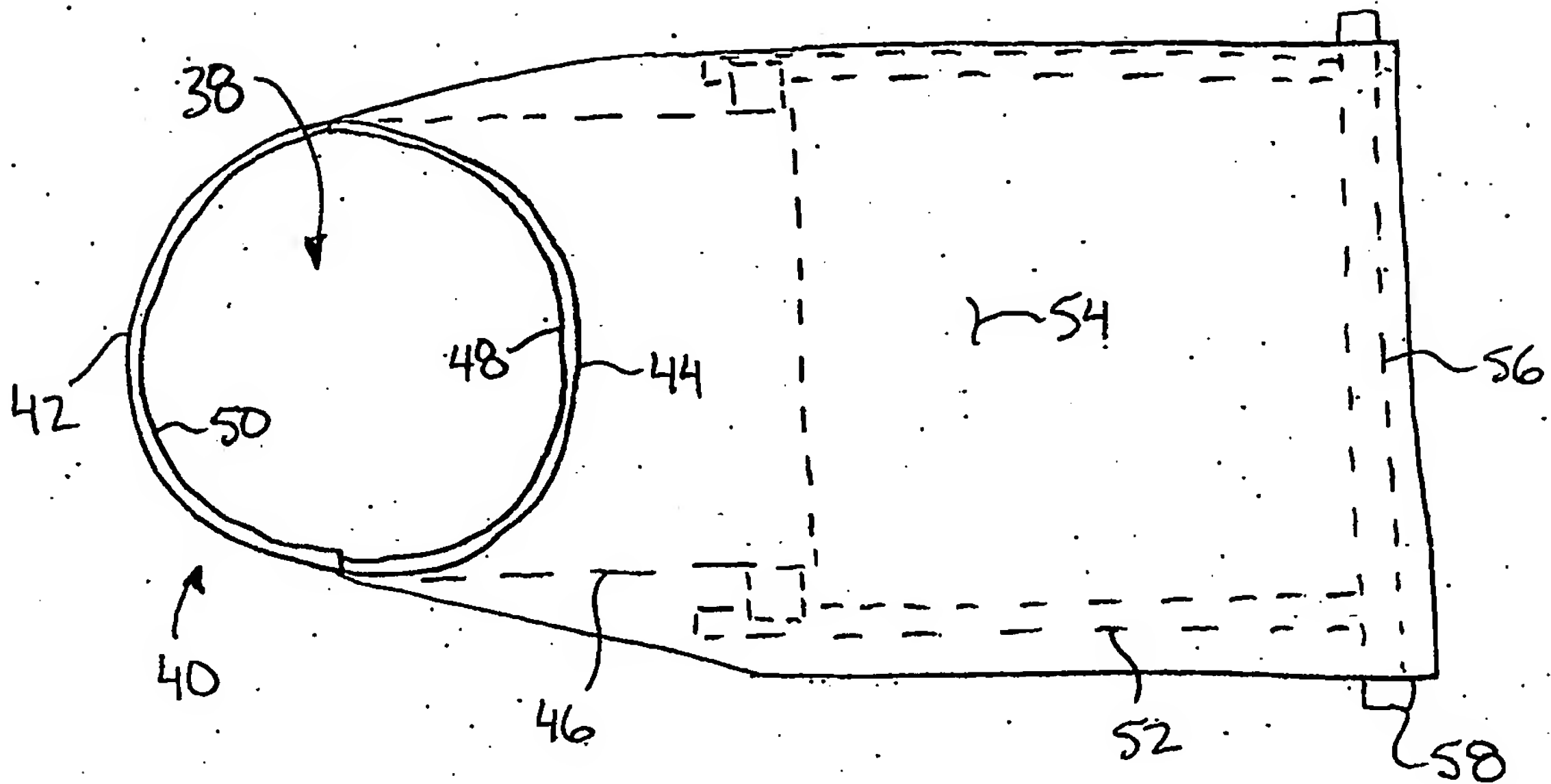


FIG. 6

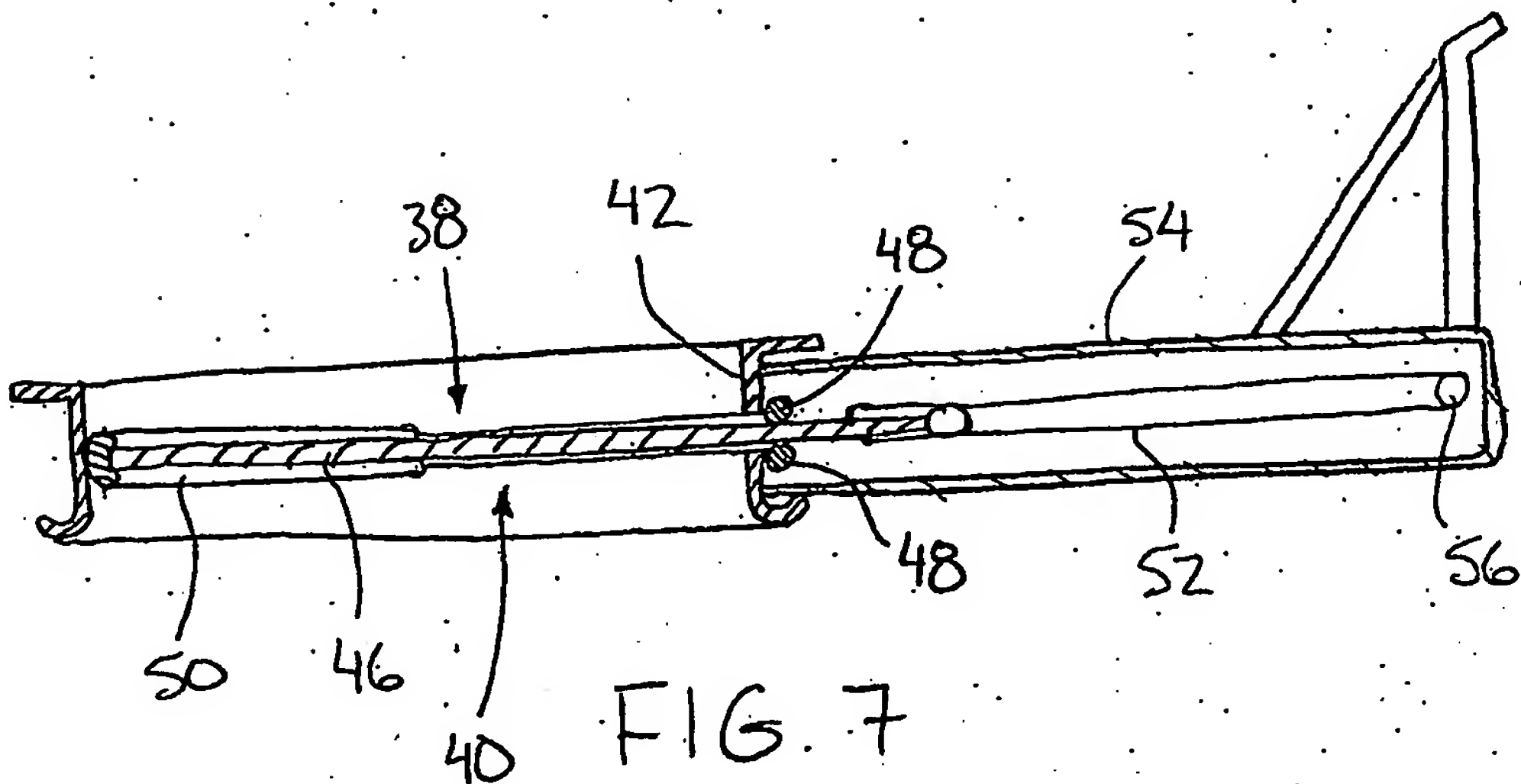
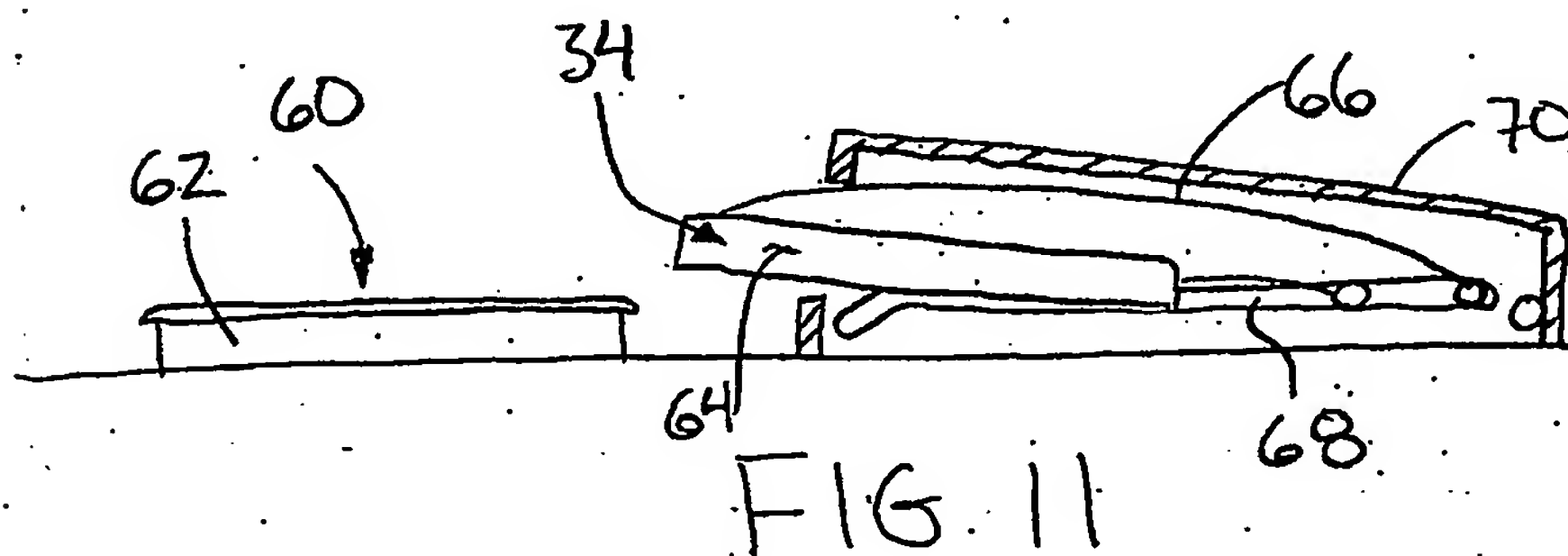
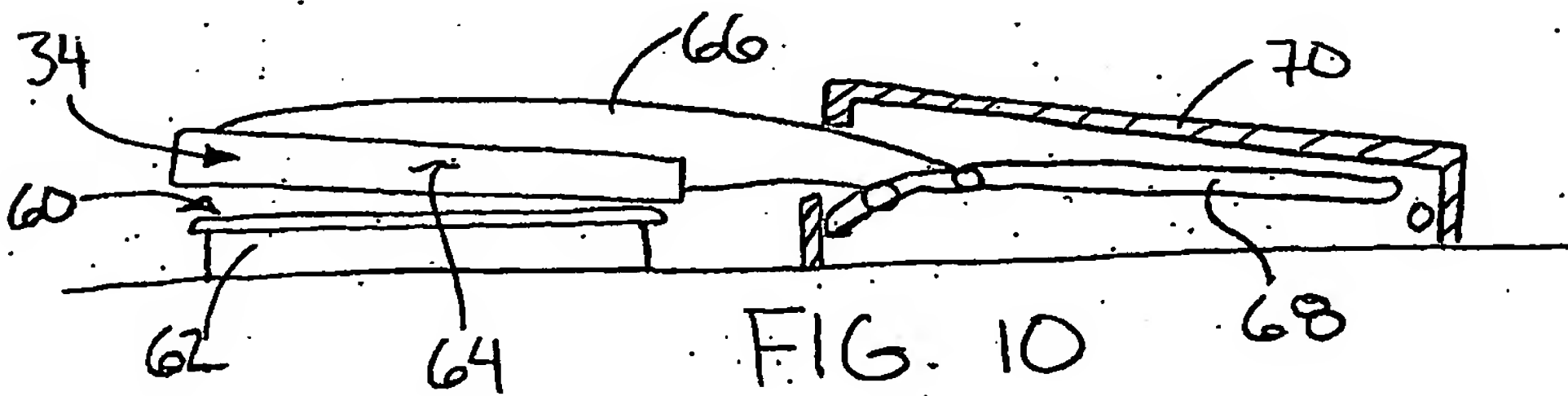
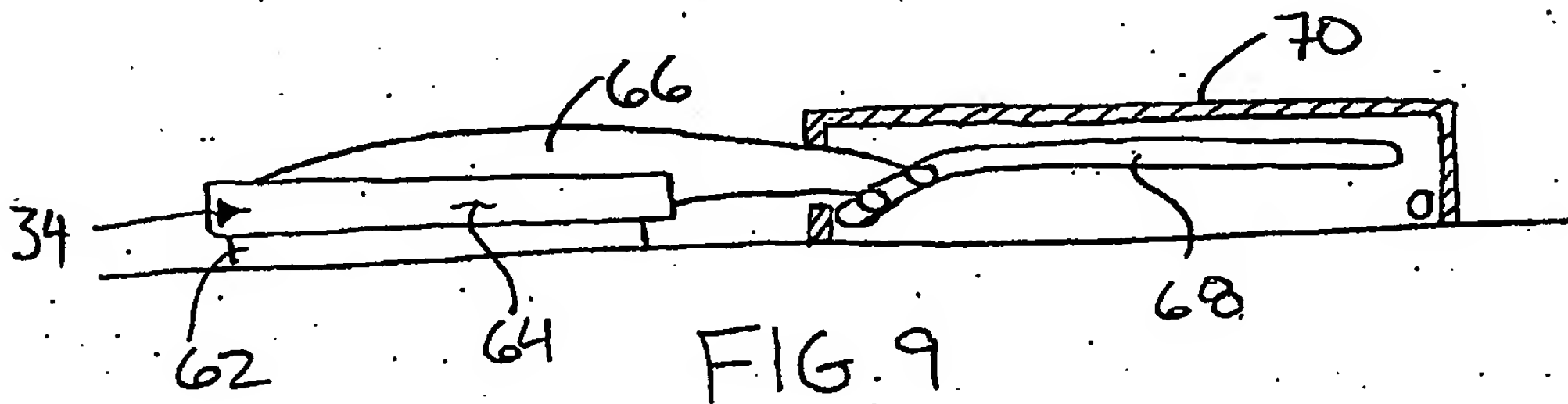
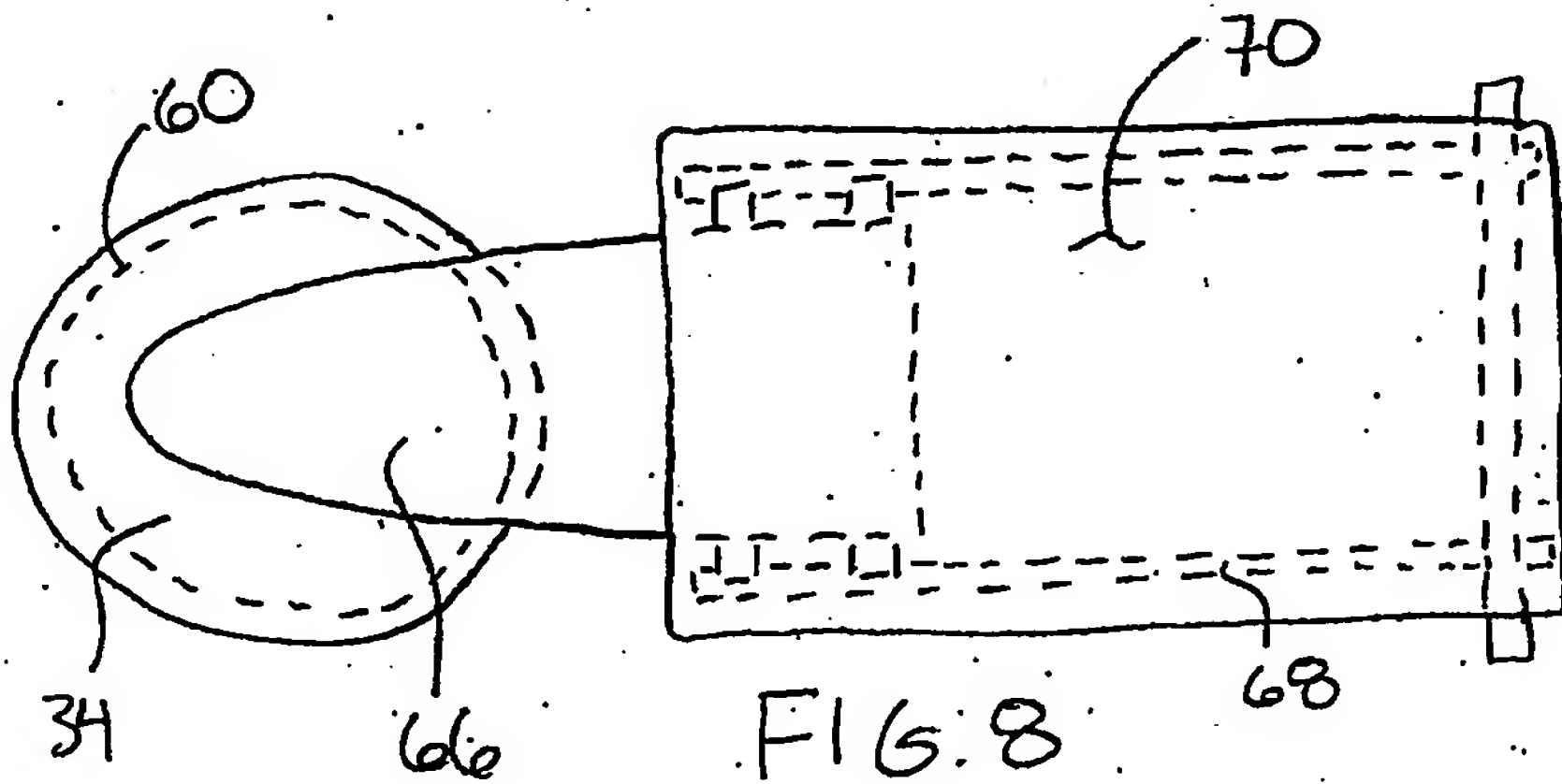


FIG. 7

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